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METEOROLOGICAL DEPARTMENT

INDIA WEATHER REVIEW, 1938

ANNUAL SUMMARY

PART B

SNOWFALL

CONTENTS

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INDIA WEATHER REVIEW, 1938.

ANNUAL SUMMARY.

PART B.

SNOWFALL.

This part contains a summary of the reports of snowfall in the mountain regions to the north and northwest of India. These reports are collected by local officers from the local residents, headmen of villages, or from travellers who have passed through the region and are then transmitted to this office.

The amount of snowfall is usually measured by finding the depth of undisturbed snow lying on the ground and such measurements are given in feet and inches. At places provided with raingauges the amount of snow collected in the gauge is melted and measured as rain; this is indicated in the text and the amounts are then given in inches and cents.

Cold Weather Period, January and February.

I.—AFGHANISTAN.

Kabul.—In the Kabul valley snow fell on seven occasions on January to a total depth of nearly a foot and on eight days in February to a total depth of $1\frac{3}{4}$ ft. with corresponding amounts on the higher hills. Most of the falls occurred over an extensive area, and travellers from Turkistan reported plentiful snow in the north. On the Haft Kotal the accumulations at the end of February were stated to be 2 ft.; all the other passes were closed. The snowfall of the season was in slight excess.

II.—BALUCHISTAN.

Quetta.—Snow fell on the high peaks round Quetta and in the city on three days in January and on four days in February. The falls in the city were light and measured 1·47″ for the whole period. The snow line descended to a height of 5,000 ft. The snowfall of the period is reported to be about the average.

III.—NORTH-WEST FRONTIER PROVINCE.

(*a*) *Hazara.*—Snow is reported to have fallen on twenty days in January and on thirteen days in February. Falls were above the normal in both the months. The snowline is said to have descended to an elevation of 4,000 ft. in January. The accumulations were slightly above the average at the end of January and slightly below the average at the end of February. The following table gives the approximate total depths of falls and accumulations at the end of each month.

Locality.	January.		February.	
	Falls.	Accumulations.	Falls.	Accumulations.
	Ft.	Ft.	Ft.	Ft.
Narang	$10\frac{1}{2}$	7	12	7
Pludran	9	$5\frac{1}{2}$	$10\frac{1}{4}$	$6\frac{1}{4}$
Kagan	$7\frac{3}{4}$	$4\frac{3}{4}$	$8\frac{1}{4}$	5
Jared	$2\frac{1}{4}$	$1\frac{1}{4}$	3	1
Malakandi	3	$\frac{1}{4}$	2	$\frac{1}{4}$
Sundigali	$6\frac{1}{2}$	2	$6\frac{1}{2}$	2
Jachha	$10\frac{3}{4}$	4	$9\frac{1}{2}$	$3\frac{1}{2}$
Thandiani	$10\frac{3}{4}$	4	$9\frac{1}{2}$	$3\frac{1}{2}$
Birangali	$6\frac{1}{2}$	$3\frac{1}{2}$	$5\frac{1}{2}$	1
Dungagali	$12\frac{3}{4}$	9	7	$2\frac{1}{2}$
Phalkot	..	..	8	$3\frac{1}{2}$
Kalabagh	..	..	$7\frac{3}{4}$	2

(*b*) *Dir, Swat and Chitral. Drosh.*—Drosh had seven light falls in January and four in February, the January falls being fairly widespread in the whole district of Chitral. Depth of snow in the Lowarai pass was reported as 6 ft. at the end of January; the highest peaks round Drosh were covered with snow at the end of February. The snowfall of the period is said to be normal.

Malakand.—Six snowstorms occurred during January; during February snowstorms occurred on the 5th, 6th, 12th to 15th and 21st. Although fairly heavy snow fell on the higher peaks, the snowfall is still said to be below the average. The snowline descended to 3,500 ft. in January and to

2,500 ft. in February. The accumulations on the neighbouring passes were reported to be 4 to 8 ft. in Jannuary and 5 to 10 ft. in February. The estimated falls and accumulations on the peaks are as follows :—

Locality.	January.		February.	
	Falls.	Accumulations.	Falls.	Accumulations.
	Ft.	Ft.	Ft.	Ft.
Mankiyal . . .	15	25	5	30
Lowarai . . .	11	13	3	16
Hindu Raj . . .	5	..	..	..
Bashkar . . .	17	28	5	33
Ilam	..	5	..	5
Mandsar . . .	..	4	..	4

(*c*) *Khyber agency.*—Snow fell thrice in January and twice in February. The heaviest fall of snow was 4″ to 6″ in the plains and 6″ to 1′ on the surrounding hills of Landikotal.

(*d*) *Kohat.*—Fort Lockhart had 2 ft. of snowfall during January and 1 ft. in February.

(*e*) *North Waziristan.*—The hilly tracts of Datta Khel had 1 ft. and ½ ft. of snow in January and February respectively. The snowline came down to a height of about 5,000 ft. The accumulation at the end of February was 2 ft. The snowfall of the period was above the average.

(*f*) *Dera Ismail Khan.*—Snow fell on the Sulaiman range on one day in January and on three days in February, the snowline coming down to an altitude of 6,000 ft. The accumulations were not exactly known, but snow was lying in thick masses on the higher ranges. The period experienced a normal fall.

IV.—Kashmir.

(*a*) *Skardu.*—The station with the surrounding mountains and peaks had snowfall on 14 days in January and on 8 days in February. The snowline descended to a height of 7,500 ft. Depths of accumulations were estimated to be about 2 ft. at the station and 14 ft. on higher passes at the end of January and 3 and 20 ft. respectively at the end of February. The accumulations were above normal.

(*b*) *Dras.*—Snow is reported to have fallen on 16 days in January and on 8 days in February throughout the district. The snowfall of the period was unprecedentedly above normal. The accumulations at the end of January and February were 4½ ft. and 6 ft. respectively at Dras, 9 and 15 ft. respectively on the higher peaks and passes, and 12½ and 24 ft. respectively on the Zojilla Pass.

(*c*) *Srinagar.*—Several light to moderate as well as some heavy falls occurred on the surrounding mountains and in the main valley. The heavy falls of February caused damage to both life and property. The falls were above the normal for the season. The accumulations at the end of the season in the surrounding mountains were appreciably greater than the normal.

(*d*) *Kargil.*—Snow fell on nine days in each month. Accumulations at the end of the period were 20 ft. on the high peaks and 7 to 8 ft. lower down. The falls and accumulations of the period were above normal.

(*e*) *Sonamarg.*—Heavy snowfalls were reported on 7 days in January and 4 days in February. They were above the average in both the months. The accumulations on the Zojilla and Nichaney passes amounted to 16 ft. at the end of January and 14 ft. at the end of February ; they were above normal.

(*f*) *Leh.*—Occasional falls of snow occurred in both the months on higher passes and peaks rendering them impassable for three weeks in February. Accumulations were about 5 ft. in both the months on the well-known high passes and peaks. The falls and accumulations of the period were markedly above the average.

(*g*) *Muzaffarabad.*—A few falls occurred in both the months. The total snowfall was above the average.

V.—The Punjab.

(*a*) *Rawalpindi.*—Snow fell on 11 days in January aggregating to 3¼ ft., 5 days in February totalling to 3¾ ft. and was confined to the highest peaks of Narar, the neighbourhood of Murree, Patriata, the Topas and Kuldana. The snowline came down to a height of 5,500 ft. above M. S. L. Falls were above the average.

(*b*) *Chamba. Tissa range.*—Nine snowstorms occurred in January and seven in February, out of which four in each month descended to a height of 3,000 ft. while the rest were confined to elevations above 6,500 ft. Both the falls and accumulations of the period were heavier and greater than usual. The following table gives the falls and accumulations at certain stations for the two months.

Locality.	January.		February.	
	Falls.	Accumulations.	Falls.	Accumulations.
	Ft.	Ft.	Ft.	Ft.
Tissa	1½	..	3	..
Bara	15	5	19	5½
Khanga . . .	11	4	12	4½
Chhatri . . .	8	5	8½	5

Bhandal range.—In each month snowfall occurred on eight days, the total amount being 3½ ft. in January and 6¼ ft. in February. Accumulations at the end of February were estimated to be 12 to 15 ft. on the higher passes and ridges. They were above normal.

Bharmaur range.—This range experienced ten days of severe snowstorms in January and six days of snowstorms of less severity in February. The falls amounted to about 10 ft. and 6 ft. respectively in the two months. They were above the average in January and normal in February. The passes were closed to traffic and the depths of accumulations were not exactly known, but at 8,000 ft. the accumulation at the end of February was 6 ft.

(*c*) *Kulu* (*Kangra District*).—Snowfalls estimated to be of an average depth of 7 and 8 ft. respectively fell in January and February on the high ranges of the district and they were above the average. The accumulations, which at the

end of both the months were above normal, are given below for the several passes.

Locality.	January.	February.
	Ft.	Ft.
Awaru pass	15	20
Sawai	17	15
Sangaru	18	15
Hampta	27	34
Rohtang	24	30
Bhabu	4½	6
Bishleu	10	7
Jalori	8	6

In the Nagar area snowfall was experienced above a height of 4,500 ft. in January and 3,000 ft. in February.

(*d*) *Kilba Hills* (*Simla District*).—Snowstorms occurred five times in January and 3 times in February. Kilba had 4 and 2½ ft. of snow in January and February respectively and Parbhani and Sangla 3¾ and 3½ ft. of snow in February. The snowline descended to a height of 5,500 ft. Falls were above the normal in both the months. All well known high passes were closed to traffic during the period and the accumulations of snow which were above normal there are estimated as under :—

Locality.	January.	February.
	Ft.	Ft.
Kailas peak	35	40
Charang pass	30	35
Rupan pass	25	27
Shathal pass	20	22
Buran pass	20	22

VI.—United Provinces.

(*a*) *Almora.*—The following table gives the falls and accumulations of snow for the two months.

Locality.	January.	February.
	Ft.	Ft.
Falls.		
Malla Danpur	15	15
Malla Johar	15	8½
Malla Darma	..	18½
Byans	25½	15¾
Chaudans	6½	4½
Accumulations.		
Nuwe	35	30
Lipu	25	28
Masurleg	25	23

The falls and the accumulations were generally above the average.

(*b*) *Garhwal.*—No information was received in January. Snow fell on four days in February above 2,000 ft. height, and the total snowfall of the season was above normal. The accumulation on high peaks was about 6 ft.

(*c*) *Naini Tal.*—Light to moderate snowfalls occurred on 5 days in January and 4 days in February. The total fall during the period was above normal.

VII.—Assam.

(*a*) *Kamrup.*—There was no snowfall within the district and all passes to Bhutan were open. Accumulations of snow on some of the high peaks to the north were 3″ to 4″ in January but began to melt away during February.

(*b*) *Baliapara Frontier Tract.*—Snowfall is reported to have occurred on the Se La and Milakatong La and to have been heavier than usual. All passes were closed on the Milakatong La ; on the Se La snow was 2 ft. deep in places.

(*c*) *Sadiya Frontier Tract.*—In February there were two heavy storms in Abor hills, snow coming down to 6,000 ft. and two of moderate intensity in Mishmi hills down to about 4,000 ft. Snowfall is reported to be normal in the Abor hills, but the depth of accumulations could not be estimated. In the Mishmi hills the accumulations were normal.

Hot Weather Period, March to May.

I.—Afghanistan.

Kabul.—A few snowstorms occurred early in March and later from the 16th to the 22nd heavy snow and sleet equivalent to 5″ of rain fell in Kabul, but melted away rapidly. This was much above normal. At the end of May there was no snow below 10,000 ft. and even the deposits on the Hindu-Kush and Paghman ranges at 14,000 ft. appeared to be scanty and below normal.

II.—Baluchistan.

Quetta.—Snow fell on the high peaks of mountains round Quetta in March, but melted away in the beginning of April. No snowfall occurred at the station either in March or April.

III.—North-West Frontier Province.

(*a*) *Hazara.*—Snow fell on eleven days in March in the inner hills being unusually heavy on the Narang, Pludran and Kagan. The falls were above normal. In the outer hills snowfall during March occurred only on four days, and was below normal.

The following table gives the amounts of falls and accumulations at the end of March. The accumulations were appreciably above normal.

Locality.	Falls.	Accumulations.
	Ft.	Ft.
Narang	13½	6
Pludran	11	4½
Kagan	8	2¾
Jared	¼	*Nil*
Malakandi	¼	¼
Jachha	1	*Nil*
Sundigali Outer Hills	¼	*Nil*
Thandiani	4¼	1½
Phalkot	3	½

(*b*) *Dir, Swat and Chitral. Drosh.*—Light snow fell on two days in March at Drosh down to 4,000 ft., and was below normal. At the end of the month surrounding hills above 9,000 ft. were covered with snow. Light snow fell on the hills above 7,000 ft. on two days in April, and at the end of the month snow was visible only above 10,000 ft. No snow fell in May and there were no accumulations on the passes at the end of the month. Accumulations on peaks were less than normal.

Chitral.—No snow fell in May, but the accumulations of snow on passes and peaks at the end of the month were above normal.

Malakand.—Snowfall occurred on 11 days in March on the Lowarai, Mankiyal and Bashkar ranges down to 6,000 ft., the falls during each storm varying from 3″ to 9″. During April heavy snow fell on two days to a total depth of 1½ ft., 3 ft., and 4 ft. respectively on the above ranges. The falls were below normal in both the months and there was no snowfall during May. The accumulations at the end of each month are given below. They were below the average of previous years.

Locality.	March.	April.	May.
	Ft.	Ft.	Ft.
Lowarai peaks	9	5	1
Mankiyal ranges	25	23	10
Bashkar ranges	27	25	12
Ilam	2	..	..
Mand Sar	2	..	..
Shiklai	5	2	..
Ranges and passes connected thereto	1 to 6	½ to 2½	..

(*c*) *Khyber Agency.*—There was no snowfall during the period nor was there any accumulation of snow on the hills and high peaks surrounding the area of Landikotal and Khyber by the end of May 1938.

(*d*) *Kurram.*—No reports were received for March and April and there was no snowfall in May. The snow accumulation on peaks at the end of May was above normal.

(*e*) *Kohat.*—Fort Lockhart had no snowfall during these months.

(*f*) *North Waziristan.*—Snowfall was reported to be heavier than last year and snow was still persisting on the higher peaks.

(*g*) *South Waziristan.*—No reports were received for March and April and no snow fell in May. The snow accumulations on Preghal at the end of May were said to be normal.

(*h*) *Dera Ismail Khan.*—Snow fell on the Sulaiman range on three days in March, the snowline coming down to a height of 9,000 ft. on the Takht-i-Sulaiman and the higher peaks. The falls were normal. No reports were received for April and May.

IV.—Kashmir.

(*a*) *Skardu.*—Snow fell on ten days in March at the station and on the surrounding mountains and on four days in April on the surrounding mountains only up to an altitude of 12,000 ft. The depths of the falls on the higher peaks and passes were about 1 ft. in March and ½ ft. in April. No snow fell in May. The accumulations at the end of each of the three months on the higher passes were about 25 ft., 20 ft., and 10 ft. respectively. They were above the normal.

(*b*) *Dras.*—Snow fell on seventeen days in March throughout the district, the total amount at Dras being 13·20″ when melted and measured. In April snowfall was observed on nine days; but no snowfall occurred in May. The falls were above normal in March and normal in April. The accumulations at the end of the months are tabulated below.

Locality.	March.	April.	May.
	Ft.	Ft.	Ft.
Dras	9	3	..
Zojilla Pass	25	12	4½
Mushkoo Hill	..	10	..

They were generally above normal in March and April and below it in May.

(*c*) *Srinagar.*—Several light to moderate falls of snow occurred on the surrounding mountains during March and April, the fall of the 19th March descending down to the main valley. In May also there were several light to moderate falls on the surrounding mountains, but only on the higher peaks. Both the falls and the accumulations were reported to be above normal.

(*d*) *Gulmarg.*—During May several light to moderate falls of snow were recorded on the Affarwat range up to Khalanmarg with thunderrain in the valley. The snowfall of the season is said to be below the average, but the accumulations on the surrounding mountains especially on the Affarwat range at the end of May were reported to be of considerable depth.

(*e*) *Kargil.*—Snow fell on sixteen days in March, and on seven days in April. There were no falls in May. The falls were heavier than those of previous years. The accumulations on the higher peaks were reported to be 20 to 30 ft. in March and April and about 12 ft. in May. They were noticeably above the average.

(*f*) *Sonamarg.*—Snowfall occurred on eleven days in March and on one day in April; no snow fell in May. The falls were above normal in March and normal in April. The accumulations were 10 ft. at the station and about 12 ft. on

the Zojilla and Nichaney passes at the end of March, 1 ft. and 4 ft. respectively at the end of April; about 2 ft. of snow remained on the Zojilla and Nichaney passes at the end of May. They were above the average in March and April.

(*g*) *Leh.*—Snow fell frequently in the first half of March, the snowline descending to a height of 11,000 ft.; in April snow fell on one day and melted away soon. The falls were slightly in excess of the average in March and normal in April. The accumulations were about 4 ft. at the end of March and April on the well-known passes and 2 ft. at the end of May. They were slightly above the normal.

(*h*) *Muzaffarabad.*—No snow fell during the period except for a slight fall on Ganga Dalla in March and again in May.

V.—Punjab.

(*a*) *Rawalpindi.*—No snowfall occurred on the hills of the district in this period, and the accumulations of winter melted away by the end of April.

(*b*) *Chamba.*—Two light falls of snow occurred at elevations above 6,500 ft. on the Tissa range early in March. Snow fell at elevations above 7,000 ft. on the Bhandal range on the 19th and 20th March. Two snowstorms occurred on the Bharmaur range above 9,000 ft. Heavy accumulations existed on the high passes at the end of March and were above normal. No reports were received for April and no snowfall occurred in May. But the accumulations on the high peaks and passes at the end of May were estimated roughly at 25 to 30 ft. and were above normal.

(*c*) *Kangra.*—Snow is reported to have fallen on the high ranges of the Himalayas in the Kangra and Palampur Tahsils and in the Kulu sub-division in all the months, March, April and May, to an average depth of 3 ft., 2 ft. and 1½ ft. respectively. The falls were above normal in March and April and below normal in May. The accumulations at the end of each month are given below. They were above normal.

Locality.	March.	April.	May.
	Ft.	Ft.	Ft.
Sawai	10	..	..
Sangaru	12	..	..
Awaru	14	..	..
Hampta	30	23	8
Rohtang	25	18	6
Bhabu	5	3	..
Bishleu	6	2	..
Jalori	6	2	..

(*d*) *Kilba (Simla District).*—Snow fell thrice in March on the Kailas range at elevations above 7,500 ft., the total fall being 11 inches at Parbhani (8,000 ft.) and 7 inches at Sangla (8,500 ft.). Snow was also observed to fall in April on elevations above 9,000 ft. There was no snow in May. The falls were generally below normal. The passes in the district were opened to traffic only in May. The accumulations at the end of March were estimated to be as follows: Kailas peak 25 ft., Charang pass 20 ft., Rupan pass 12 ft., Buran pass 10 ft. and Shathal pass 10 ft. Information is not available for the other months.

VI.—United Provinces.

(*a*) *Garhwal.*—Four falls of snow occurred during March to a depth of ½ to 4 feet. The falls were above normal. The accumulation at the end of March on high peaks was about 10 ft., and was above normal. No snow fell in April and May.

(*b*) *Almora.*—The following table gives the amount of falls and accumulations for each month. The falls were generally below the average, whereas the accumulations were about the normal at the end of each month.

Locality.	March.	April.	May.
Falls.	Ft.	Ft.	Ft.
Malla Johar	1	3	½
Malla Danpur	3	3	2½
Malla Darma	6	3¾	2½
Chaudans	2¾	1½	¾
Byans	3	..	4
Accumulations.			
Lipu	14	..	10
Nuwe	18	15	13
Lampia	19	..	15
Masurleg	16	12	10

South-West Monsoon Period, June to September.

JUNE AND JULY.

I.—Afghanistan.

Kabul.—There was no appreciable snowfall on any of the mountain ranges of Afghanistan during the months of June and July. No accumulations existed at the end of July on any of the peaks of Kabul district and the snowline on the distant mountains was quite high.

II.—North-West Frontier Province.

(*a*) *Hazara.*—The total amounts of snowfall during the two months were estimated at values ranging from 0′ 3″ at elevations of 10,000 ft. to 0′ 8″ at elevations of 17,000 ft. The accumulations at the end of the period ranged from 3′ at the lower levels to 8′ at the higher levels, these depths being slightly above the average.

(*b*) *Dir, Swat and Chitral. Drosh.*—No snowfall occurred during either of these months. Even at the end of June the surrounding hills were free from snow, excepting two peaks on the east, which continued partially covered. At the end of July, there was no snow on any of the neighbouring peaks; only a thin layer was seen on distant mountains at elevations exceeding 15,000 ft.

Chitral.—About an inch of snow was seen to fall in July on the higher peaks; there were no accumulations in the passes at the end of the period.

Malakand.—There was no snowfall during the period. The accumulations on the Mankiyal and Bashkar peaks were estimated at 6 ft. and 7 ft. respectively at the end of June, and on both at 5 ft. at the end of July.

(*c*) *Khyber.*—There was no snowfall during the season. An accumulation of about 2½ ft. existed on the high peaks of Morga hill.

(*d*) *Kurram.*—No snowfall occurred during the period, either in the district or on the adjoining hills. The snowline was slightly lower than the average, though the depth of snow appeared less than usual. Accumulations at the well-known passes and peaks were estimated to be :—

Sikaram peak	3′
Badina peak	2′
Zeran pass	Trace.
Sikaram pass	Trace.

(*e*) *Waziristan.*—No report was received from North Waziristan. In South Waziristan, there was no snowfall in either month, and no accumulation remained at the end of the period.

III.—Kashmir.

(*a*) *Skardu.*—Snowfall occurred on the surrounding mountains on three days in June, and once in July; the snowline descended to a height of about 12,000 ft. each time. The depth of snow on the higher peaks and passes were estimated at 5 ft. at the end of June and 3 ft. at the end of July.

(*b*) *Dras.*—Two light falls of snow were observed on the mountains in June; no snowfall occurred in July. The depth of snow on the higher peaks was estimated at 3½ ft. at the end of June and 2½ ft. at the end of July.

(*c*) *Srinagar.*—Several light falls of snow occurred on the surrounding mountains in both the months. The total amount of snowfall was estimated to be much above the average in June, and slightly above the average in July. The accumulation on the surrounding mountains was of considerable depth at the end of June, but it decreased to the average thickness at the end of July.

(*d*) *Gulmarg.*—Several light to moderate falls occurred on the Affarwat range during the first half of June, and there was one fall in July. The monthly amounts were normal but the accumulations were estimated to be below the average.

(*e*) *Kargil.*—Snowfalls occurred on the high peaks on three days in June and one day in July. The amounts were above normal. Snow accumulations on the peaks were also above normal, being estimated at about 8 ft. at the end of the period.

(*f*) *Sonamarg.*—There was no snowfall. The accumulations melted away before the end of June.

(*g*) *Gurez.*—There was no snowfall. The accumulations disappeared by the end of the period.

(*h*) *Leh.*—There was no snowfall. The passes were clear of snow. The accumulations on the high peaks were normal.

(*i*) *Muzaffarabad.*—There was no snowfall in either month. Some remnants of snow existed on the surrounding hills in June, but all the snow melted away before the end of July.

IV.—Punjab.

(*a*) *Chamba.*—Two snowfalls occurred in June at elevations above 9,000 ft. The accumulations at the end of the season were below the average.

(*b*) *Kulu (Kangra District).*—There were light falls of snow in both the months at elevations above 14,000 ft. The accumulations appeared thicker than the average.

(*c*) *Kilba (Simla District).*—Light falls only were observed on the high peaks. The amounts were below normal. All the peaks and passes were free from snow by the end of the season.

V.—United Provinces.

(*a*) *Almora.*—The inference from the reports received is that the snowfall was generally normal or in excess in June and generally in excess in July. The accumulations at the end of the period were slightly above the average. The following table gives the amounts and accumulations as estimated by the villagers.

Locality.	June.	July.
	Ft.	Ft.
Falls.		
Malla Johar	2	1½
Malla Danpur	2½	..
Malla Darma	8	5
Chaudans	6	4
Byans	9	4
Accumulations.		
Lipu	6	4
Lampia	9	6
Unta Dhura	..	3½

(*b*) *Garhwal.*—There was no snowfall in localities below 14,000 ft. during either June or July. The depth of accumulation at levels higher than 14,000 ft. was about 2 ft. at the end of the period.

AUGUST AND SEPTEMBER.

I.—North-West Frontier Province.

(*a*) *Dir, Swat and Chitral. Drosh.*—No snowfall occurred at the station. A few falls were, however, observed in

September on the hills to the south-east of the station, but the snow melted away within three days. At the end of the period only the Madagalasht peaks showed traces of snow accumulation.

Malakand.—No snow fell at the station during the period. The accumulations at the end of September were 2 to 4 feet deep on the Mankiyal, Bashkar and Hindu Raj mountains; the snowline was at about 15,000 ft. height.

II.—Kashmir.

(*a*) *Skardu.*—Snow was seen to fall on the surrounding mountains on three days in August and one day in September; the snowline descended to about 12,000 ft. level each time. The depth of accumulation on the higher peaks and passes was reported to be about 2 ft. at the end of September.

(*b*) *Dras.*—No falls were observed in August, but in September snow was seen to fall on the mountains on five days, on one of these days sleet occurred at the station. Accumulations measuring 3 to 4 inches existed on the higher peaks at the end of the period.

(*c*) *Srinagar.*—A few light falls of snow were observed on the higher peaks during August; in September several light to moderate falls were observed, the snowline having descended much below the usual level on some occasions. The snowfall amounts were estimated as normal in August, but above normal in September. Accumulations at the end of the season appeared thicker than usual.

(*d*) *Gulmarg.*—No falls occurred in August. In September light to moderate falls were observed on the Affarwat range; on three days the snowline descended to Khalanmarg. The snowfall in September was above the average. Only thin layers of snow existed on the peaks of the Affarwat range at the end of the season.

(*e*) *Kargil.*—There was no snowfall in August; in September two falls were observed on the higher peaks. Accumulations appeared thicker than usual and were estimated at 4 to 6 ft. in depth.

(*f*) *Sonamarg.*—No snow fell in either month. The neighbouring mountains were clear of snow.

(*g*) *Leh.*—No snowfall occurred during the period. All the passes were free from snow.

(*h*) *Muzaffarabad.*—Only one fall was observed on the Ganga Dalla towards the end of September. The peaks were clear of snow.

III.—Punjab.

Kilba (Simla District).—The height of the snow line was estimated at 13,500 ft. at the end of August. Two light falls were observed in the second and third week of September, and the snowline descended to 11,000 ft. The snowfall of the period was below the normal. All the passes and peaks were clear of snow during the season.

IV.—United Provinces.

(*a*) *Almora.*—The amounts of the falls in each month and the accumulations at the end of each of the months, as estimated by the patwaries, are given in the table below.

Locality.	August.	September.
	Ft.	Ft.
Falls.		
Malla Danpur	1	2½
Malla Johar	½	1½
Byans	2½	..
Malla Darma	7	7
Chaudans	..	3
Accumulations.		
Untadhura	5	3
Masurleg	10	11
Lipulekh	12	..
Lampia	14	..
Nuwe	..	7

(*b*) *Garhwal.*—There were no falls in either month. The accumulations at the end of the period on the high peaks were estimated as 2 ft. deep.

The Retreating Monsoon Period, October to December.

I.—Afghanistan.

Kabul.—Snow occurred earlier than usual. Slight falls were observed on the peaks of the Paghman and Hindukush hills on the 31st October and also on the 1st and 14th of November. Snowfall on all the surrounding hills occurred on several occasions during the second half of November and in December. In Kabul valley there was snow on two days in November and on two days in December; the amounts were estimated at 10 inches in November and 7 inches in December. The total snowfall of the district during the period was reported to be in excess of the average. The hills were covered with snow at the end of December, and Kabul itself had a snow cover of about 3″ in depth.

II.—Baluchistan.

Quetta.—No report was received in respect of the second half of December. Only one snowfall was observed, on the 20th November, on the tops of the hills around the station. The hills were clear of snow in the middle of December.

III.—North-West Frontier Province.

(*a*) *Hazara.*—No reports were received for October and November. The following table gives the estimated amounts

of snow that fell in December and the accumulations at the end of the month. Both were below normal.

Locality.	Falls.	Accumulations.
	Ft.	Ft.
Thandiani	3	2
Birangali	2	½
Phalkot	2½	..
Malakandi	¼	..
Sundigali	3	1¼
Jachha	1¾	¾
Narang	4½	4
Pludran	3¼	2½
Kagan	3	2
Jared	¾	Traces.

(*b*) *Dir, Swat and Chitral. Drosh.*—No reports were received for October and for the second half of December. Three light falls were observed on the surrounding hills at altitudes of 10,000 ft. or more in November, and one in December. The snowfall of the period was reported to be below normal. The snowline was for the most part beyond the 14,000 ft. level.

Malakand.—A fall of about 5″ was reported from the Lowari pass on the 22nd October and one about 7″ on the 21st November. In December, snowstorms occurred on 17th-19th and on 20th-21st on the Lowarai, Bashkar and Swat Kohistan ranges; the snowline descended to 6,000 ft. on these occasions. The falls of the season were below the normal. The accumulations at the end of each of the months are given in the following table :—

Locality.	October.	November.	December.
	Ft.	Ft.	Ft.
Bashkar	1	1½	9
Hindu Raj	3	3	4
Lowarai	..	..	6
Mankiyal	..	..	10
Ilam and Dwa Sarai	..	..	2

(*c*) *Kurram.*—Snow is reported to have occurred in Parachinar and the surrounding hills on three days in November and on three days in December. The accumulations on the peaks of Safed Koh were reported to be thicker than usual.

(*d*) *Kohat.*—There were a few falls on the higher ranges; two falls were observed between the 20th-21st December on the Samana range. The Samana range was well below the snowline at the end of December.

(*e*) *Waziristan.*—No report was received from North Waziristan. In South Waziristan light falls occurred at elevations between 6,000 ft. to 11,000 ft. in December.

IV.—Kashmir.

(*a*) *Skardu.*—Snowfall occurred on the surrounding mountains once in October but no snow fell in November. The snowfall on the mountains in December was estimated at 5 ft. For the season as a whole the snowfall was reported to be normal.

(*b*) *Dras.*—Three falls were observed in October on the surrounding hills, and one at the station; three falls occurred in the district in November and eight in December. At the end of December the accumulations were estimated at 1½ ft. in the neighbourhood of Dras, 4 ft. at the Zojilla pass and 5 ft. on the peaks.

(*c*) *Srinagar.*—Several light to moderate falls were observed on the surrounding mountains in each of the months. There was snowfall in the Srinagar valley on the 21st of December. The amounts of snowfall were reported to be above the average in October, and about normal in November and December. The accumulations on the surrounding mountains at the end of December were reported to be thicker than usual.

(*d*) *Kargil.*—Falls were observed on the mountains on six days in October and nine days in November. The number of occasions of snowfall on the mountains in December was not reported, but four light falls were reported to have occurred during the month at the station itself. The falls of the season were below the average. The accumulations at the high passes were estimated as about 5 ft. thick at the end of the season.

(*e*) *Sonamarg.*—No snow fell in October. There were two falls in November and five in December. Snowfall was reported as less than normal in November and normal in December. The accumulations at the end of the period were below normal, being reported as 4 ft. thick in the neighbourhood and 5 ft. thick on the Zojilla and Nichaney passes.

(*f*) *Leh.*—Slight falls were observed on the high peaks in each of the three months. There was no snowfall at the station. The amounts were estimated as normal in October and November, but below normal in December. The accumulation at the end of the season on high peaks was reported as ½ ft. thick, and the snowline was said to lie at a height of 13,000 ft.

(*g*) *Muzaffarabad.*—Muzaffarabad reported slight snowfall on the hills during October and December, and only a few falls on the Ganga Dalla in December. The accumulations were also estimated as less than the average.

V.—Punjab.

(*a*) *Kulu* (*Kangra District*).—No snow fell in October, one fall occurred in November and one in December. The falls of the season were below the average. The depths of accumulations at the end of the period were estimated at about 8 ft. on the Hampta pass, and 6 ft. on Sirikhand; at the Bashleo and Jalori passes, which were open to traffic, the accumulations were about 3 ft. deep. The accumulations reported were slightly above normal. The snowline was estimated at 5,300 ft. in Kulu proper and 6,000 ft. in Seraj.

(*b*) *Chamba.*—In November, one light fall was reported at the Gharam station and two light falls on the Pangi range. During December, one fall was reported on Bhandal range, two at Gharam, two on the Tissa range, and five on the Pangi range. The snowfall of the period was below normal. The accumulations were also below the average, being reported as traces in the Padri pass, 2 ft. at Kilar pass, and 5 ft. at the Kwarsi pass.

(*c*) *Kilba* (*Simla District*).—Snowfall occurred on one day in October, on three days in November and on two days in December. The falls were below normal in October and

December, and normal in November. The passes were closed for traffic by the end of November.

VI.—United Provinces.

(*a*) *Almora.*—The falls of all the three months were reported to be below normal. The total amounts of the falls and the accumulations, as estimated by the patwaries, are given below :—

Locality.	October.	November.	December.
	Ft.	Ft.	Ft.
Falls.			
Malla Danpur	3½	2½	3
Malla Johar	3½	4	2
Malla Darma	6	5½	3
Chaudans	3	1	..
Byans	4½	..	..
Accumulations.			
Untadhura	5	12	..
Lipu	6	..	..
Lampia	9	..	..
Masurleg	..	11	..
Bagodiyar	..	..	5
Nuwe	..	..	9

(*b*) *Garhwal.*—There were two falls in October, one in November, and one in December. The December fall was confined to the northernmost parts of the district. The amounts of all the three months were estimated as below the normal. The accumulations on the high peaks were reported to be 2 ft. deep at the end of October, and 1 ft. deep at the end of November.

VII.—Assam.

(*a*) *Kamrup.*—The snowfall was reported to be less than the average, and the accumulations as normal.

(*b*) *Sadiya Frontier Tract.*—In the middle of November heavy falls were observed on the Takeh Adi, Miri Pandi and Pasudin peaks of the Upper Minyong country. There were no falls in other parts of the tract. The snowfall of the period was much below the average.

(*c*) *Baliapara Frontier Tract.*—The report received only states that the snowfall of the period was less than usual.

Summary.

Cold Weather Period, January and February.—Falls and accumulations were above the average in Kashmir, the Punjab and the United Provinces, slightly above the average in Afghanistan and average in Baluchistan, the North-West Frontier Province and Assam.

Hot Weather Period, March to May.—Falls were below normal in Afghanistan and Baluchistan, normal in the North-West Frontier Province and the United Provinces, and above normal in Kashmir and the Punjab. The accumulations at the end of May were for the most part slightly below normal.

South-West Monsoon Period, June and July.—Falls were below the average in the North-West Frontier Province and the Punjab, and about the average in Afghanistan, Kashmir and the United Provinces. The accumulations at the end of July were generally about the average.

South-West Monsoon Period, August and September.—Falls and accumulations were below normal except in Kashmir where they were slightly in excess of the average.

Retreating Monsoon Period, October to December.—Falls were below normal, except in Kashmir and Afghanistan, where they were about the average. Accumulations were in general below normal.

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